Radio Observations of Organics in Comets

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Abstract:

A major observational challenge in cometary science is to quantify the extent to which chemical compounds can be linked to either interstellar or nebular chemistry. Recently, there have been complimentary observations from multiple facilities to try to unravel the chemical complexity of comets and their origins. Incorporating results from various techniques can gain further insight into the abundances, production rates, distributions, and formation mechanisms of molecules in these objects [1]. Such studies have provided great detail towards molecules with a-typical chemistries, such as H_2CO [2]. We report multiwavelength spectral observations of comets from two dynamical families including the JFC 103P/Hartley 2 and a long period comet C/2009 P1 (Garradd) with the Arizona Radio Observatory's SMT and 12-m telescopes, as well as the NRAO Greenbank telescope, and the James Clerk Maxwell Telescope. Multiple parent volatiles (e.g. HCN, CH_3OH, CO) as well as daughter products (e.g. CS and OH) have been detected in these objects. We will present a comparison of molecular abundances in these comets to those observed in others, supporting a long-term effort of building a comet taxonomy based on composition. Previous work has revealed a range of abundances of parent species (from "organics-poor" to "organics-rich") with respect to water among comets [3,4,5], however the statistics are not well constrained.

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